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## **The U.S. Sugar Industry under EU and Doha Trade Liberalization**

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## **Abstract**

This study evaluates potential reforms of the EU and some liberalization policies under the Doha agenda proposal. Results indicate that EU sugar policy reforms will increase the Caribbean sugar price from 8.7 to 9.96 cents, but will not affect the U.S. sugar industry. If the world sugar industry is liberalized on the basis of the WTO-Doha framework proposal, U.S. sugar imports will increase to 1.9 million tons and wholesale price will decrease from 24.89 to 23.79 cents per pound. Under this scenario, it is also expected that the Caribbean price will increase from 8.7 to 12.1 cents per pound. Brazil will benefit the most as production and export sales increase.

**Keywords:** sugar, liberalization, production, price, EU reform, Doha

## Highlights

In 2004, the European Union (EU) proposed reforms in which a significant price cut and a reduction in the production quota were incorporated. Additionally, under the Doha Development Agenda, substantial improvement in market access is being discussed for all agricultural products, including sugar. This study evaluates the impact of potential trade liberalization policies on U.S. producers and consumers and implications for the world sugar market.

If the recently proposed reforms in the EU sugar program are implemented, U.S. beet and cane sugar production will increase, but at marginal levels. Also, we expect marginal increments in consumption and no change in net imports. Sugar beets, sugar cane, and wholesale sugar prices in the United States are projected to decrease by 1 percent. In contrast, the Caribbean price is expected to increase from 8.7 cents to 9.96 cents per pound, which represents a 14.5 percent increase compared to the base-line scenario.

Under the Doha scenario, our model simulates the EU changes, plus a 20 percent reduction in sugar import tariffs and a 20 percent increase in import quotas in China, Japan, and the United States. Results indicate that beet and cane sugar production in the United States are expected to decrease by only 1.0 and 0.8 percent, respectively, and total consumption is expected to increase by 0.9 percent. Freer trade policies will increase U.S. imports to 1.9 million tons, which represents a 15.3 percent increase. Prices are expected to decrease to 38.96 (3.4 percent) and 26.43 dollars per ton (4.7 percent) for sugar beets and sugar cane, respectively. In addition, wholesale sugar price in the United States is expected to decrease by 4.4 percent to 23.79 cents per pound. By contrast, the world sugar price is projected to increase by 39 percent to 12.1 cents per pound, 3.4 cents higher than the base scenario. Implementation of this scenario may increase social welfare in the United States, but because of reduced prices, the policy may affect sugar producers in the United States.

With higher Caribbean price under the Doha scenario, Brazil will benefit most, as production and export sales increase, followed by Thailand and Australia. The EU, India, and China are expected to increase imports substantially. The United States and Japan will increase imports moderately.

# **The U.S. Sugar Industry under EU and Doha Trade Liberalization**

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## **INTRODUCTION**

Many producing countries in the world provide protection to their sugar industries using direct or indirect support instruments. However, regional and multinational free trade agreements are creating pressure for sugar producing countries to reform their sugar policies. For instance, in April 2005, the World Trade Organization (WTO) ruled on the appeal of a dispute brought by Australia, Brazil, and Thailand against the EU sugar regime. The panel concluded that the EU had been exporting more sugar under export subsidies than is permitted in the WTO agreement. As a result of this decision, the EU will be required to substantially reduce its expenditure in sugar support programs and adopt policies that are in line with the recommendations from the WTO panel.

In July 2004, independent of the WTO-panel's decision, the EU proposed a reform schedule that is expected to be published in some form in June 2005. The changes are oriented to increase competitiveness and will frame the EU sugar position for the WTO-Doha Development Agenda (DDA) negotiations in Hong Kong in December 2005. Also, under the current WTO-DDA, member countries are negotiating substantial improvements in market access which will be applied to all agricultural commodities, including sugar.

The future of the U.S. and the world sugar industries is uncertain under these potential policy changes (Kelch and Normile, 2004; Roney, 2004). Therefore, it is important to study the impact trade liberalization will have on U.S. producers and consumers and the implications for the world sugar market.

Previous research has evaluated the effect of trade liberalization policies on the sugar industry in the United States and world markets (Koo, 2002; Beghin et al., 2001; Haley, 2000; U.S. General Accounting Office, 2000; Borrell and Pierce, 1999). These studies have reported an increase in world sugar price when major sugar markets move toward freer trade policies. Borrell and Pierce (1999) and Koo (2002) found that if the EU and the United States liberalize their sugar industries, it will cause the world price to increase by 68 and 20 percent, respectively. However, if only the United States liberalizes its sugar industry, world price will increase by 33 percent and the U.S. wholesale sugar price will decrease by 20 percent. Haley (2000) found that, under a free trade scenario, U.S. wholesale sugar price would decrease 13 percent.

In terms of social benefits, studies found that reduced sugar prices in the United States would create an increase in consumer surplus and a reduction of producer surplus (Koo, 2002; U.S. General Accounting Office, 2000).

The objectives of this paper are to evaluate the potential effect of the recently proposed sugar policy structural changes in the EU and the currently proposed changes under WTO-Doha

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negotiations. The global sugar policy simulation model developed by Benirschka et al. (1996) was used for the analysis of alternative scenarios. The following section presents a description of sugar policies, production, and consumption trends in selected countries. In section 2, the sugar model and alternative scenarios are discussed. Section 3 includes results of the simulation model, and the final section summarizes the results.

## **SUGAR POLICIES IN SELECTED COUNTRIES**

### ***China***

In China, the government provides price incentives for producers and controls imports and stocks to maintain high internal sugar prices (Economic Research Service (ERS) - U.S. Department of Agriculture (USDA), 2003). In 2004, the tariff rate quota was set at 1.8 million metric tons (MT), with a tariff rate of 20 percent within the quota and 27 percent for over quota imports. This represents a 65 percent reduction from the 2001 over quota tariff (Mitchell, 2004; ERS-USDA, 2003). Although strong competition exists between sugar and artificial sweeteners, total sugar production has doubled since 1989 (from 5.6 million MT to 11.2 million MT in 2004). Despite increased production, Chinese imports of sugar have grown by 6 percent from 1989 (1.1 million MT) to 2004 (1.2 million MT). Domestic consumption of sugar has increased by 64 percent, rising from 7.5 million MT in 1989 to 12.2 million MT in 2004. As a result, exports of sugar from China declined from 624,000 MT in 1989 to 50,000 MT in 2004, a drop of 92 percent (ERS-USDA, PS&D Tables).

### ***European Union (EU)***

The EU sugar program started in 1965 as part of the Common Agricultural Policy (CAP), with no major amendments since its inclusion. The program is primarily financed by EU consumers, who pay a higher sugar price than the world market price. The last version of the sugar policy was completed in 1995, which extended its validity until the 2000/2001 marketing year. The CAP provides protection for the sugar industry through guaranteed intervention and minimum prices, production quotas, import controls, and export subsidies (ERS-USDA, 2003). Other safeguards are applied for sugar used in the production of alcohol and yeast, and for isoglucose and inuline syrup. As a result, the domestic wholesale price of refined sugar is about 300 percent higher than the world price (Roney, 2004).

The intervention price is a mechanism by which agencies are committed to purchase eligible sugar at a minimum price, which has been constant since 1993 at €631.90 (780 U.S. dollars) and €523.70 (646.5 U.S. dollars) per metric ton of refined and raw sugar, respectively (European Commission, 2004 (b); Mitchell, 2004). EU policy has also established minimum prices at which sugar processors are required to buy from beet growers. The prices, unchanged since 1992, are set at €46.72 (57.7 U.S. dollars) and €32.42 (40.0 U.S. dollars) per metric ton for beets used to produce A-quota sugar (82 percent) and B-quota sugar (18 percent), respectively. The difference between the two quotas is mainly the amount of levies applied to each of them. During the period 2003-2004, the total production quota was about 17.4 million MT (EU-25). This was divided into the 14.7 million MT A-quota, in which the outlet is guaranteed and the guarantee price may be reduced up to 2 percent for the production levies, and the 2.7 million MT



*B*-quota, of which the outlet is also guaranteed but at a price which can be decreased up to 39.5 percent for levies. *C*-quota sugar, which must be exported with no subsidy or stored and used as part of the following year's *A* and *B* quotas, varies from year to year at about 3.0 million MT. Production quotas are also established for isoglucose (0.5 million tons) and inulin syrup (0.3 million tons) (ERS-USDA, 2004).

Imports are restricted by the implementation of two tariffs, one fixed and the other depending on the volatility of the world market price of sugar. The fixed duty is established at €419 (517 U.S. dollars) and €339 (419 U.S. dollars) per metric ton of refined and raw sugar, respectively. During 2004, sugar imports carried an average total import tariff level of about €700 (864 U.S. dollars) per metric ton (ERS-USDA, 2004).

Special access to the EU sugar market has been given to 46 countries from Africa, the Caribbean, and the Pacific (ACP), as well as to India. These countries can export sugar to the EU at internal prices. The total import agreement was set at 1.3 million MT in 1975. In 1995, another import allocation (200,000 to 350,000 MT) was made to ACP countries. Additionally, the EU took over import commitments from new member-states in 1995, totaling 85,500 MT. Also, 100,000 MT were temporarily granted to several countries in the Balkans in 2001/02 (Mitchell, 2004).

In July 2004, the EU proposed new reforms in its sugar policy which follow the basic principles of reforms implemented in 2003, and are expected to go into effect, in some form, in 2005 (Kelch and Normile, 2004; European Commission, 2004 (a)).

The reforms include the following:

1. A cut in the intervention price (renamed "reference price") of refined sugar from €632 to €421 (780 to 520 U.S. dollars) per MT. Also, the proposal reduces the tariff protection to €421 per metric ton, which is at the same level as the proposed reference price.
2. Reduction of sugar beet price from €32.8 to €27.4 (40.5 to 33.8 U.S. dollars) per MT.
3. Production quota reduction from 17.4 million MT to 14.6 million. The proposal applies to *A*-sugar only, and the other categories are no longer considered. Additionally, the production quota of isoglucose is increased from 0.5 to 0.8 million MT.
4. New member countries (Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia) are compensated as old members in terms of sugar support programs.
5. Introduction of decoupled payments to sugar farmers in the form of Single Farm Payments (SFP) to compensate 60 percent of lost revenue due to price and quota reductions. SFP will be granted to farmers who grew sugar beets during the reference period (2000-2002) and will not be affected by any subsequently quota transfers.

6. Sugar imports from the ACP and India will remain at 1.3 million MT; however, the price is reduced from €421 to €329 (519.8 to 406.2 U.S. dollars) per MT.

If the EU is able to pass such reforms, production and exports would be substantially reduced, potentially increasing world sugar prices (Kelch and Normile, 2004; European Commission, 2004 (a)). According to the EU Commission, reduction of export subsidies and decoupling aid from sugar beet producers will increase domestic sugar imports from developing countries. By contrast, reports from the American Sugar Alliance (ASA) have concluded that because of the diminished role of the EU in the world sugar market, the proposed sugar policy reform will not be an important factor in world sugar prices and in the U.S. sugar industry. According to the ASA, the proposed sugar policy will not preclude large volumes of sugar exports from the EU, and the proposed price reduction would still leave domestic wholesale sugar prices above U.S. price levels.

The EU has an important place in the world sugar market. In terms of the world trade share, the EU accounts for about 14 percent of production, 13 percent of consumption, 12 percent of exports, and 5 percent of imports. With the recent enlargement of the organization, EU-25, production is expected to be between 19-20 million MT. Sugar is produced from sugar cane (2 percent) and beets (98 percent) in almost all member states, with the exception of Luxembourg, Estonia, Cyprus, and Malta. Major producing states are France and Germany, with about 50 percent of total production, followed by Poland, Italy, and the United Kingdom (European Commission, 2004 (b)).

For the EU-15 member countries, both production and domestic use have significantly increased over time (ERS-USDA, PS&D Tables). Total sugar production and consumption in 1961 was 6.3 and 5.5 million MT, respectively; in 2004, production and consumption totaled 16.5 and 14.4 million MT. Despite this significant change from the 1960s levels, production has remained relatively stable since 1992 and domestic consumption has been almost constant since the beginning of the 1990s (Figure 1). From 1961 to 1981, total exports of refined sugar increased (Figure 2). From 1981 to 2003, exports have varied between 5 and 7 million MT, and in 2004, total exports were 4.6 million MT. Exports have exceeded imports since 1977. Imports increased substantially from 1961 to 1974; since 1978, they have been relatively stable and significantly below the volume of sugar exports (Figure 2). Total imports, mostly in raw sugar, were 2.1 million MT in 2004. In general, the EU is a net exporter; however, because of the difference between the high price paid for imports relative to the low price received for exports, a negative trade balance in terms of value has existed since 2002 (European Commission, 2004 (b)).

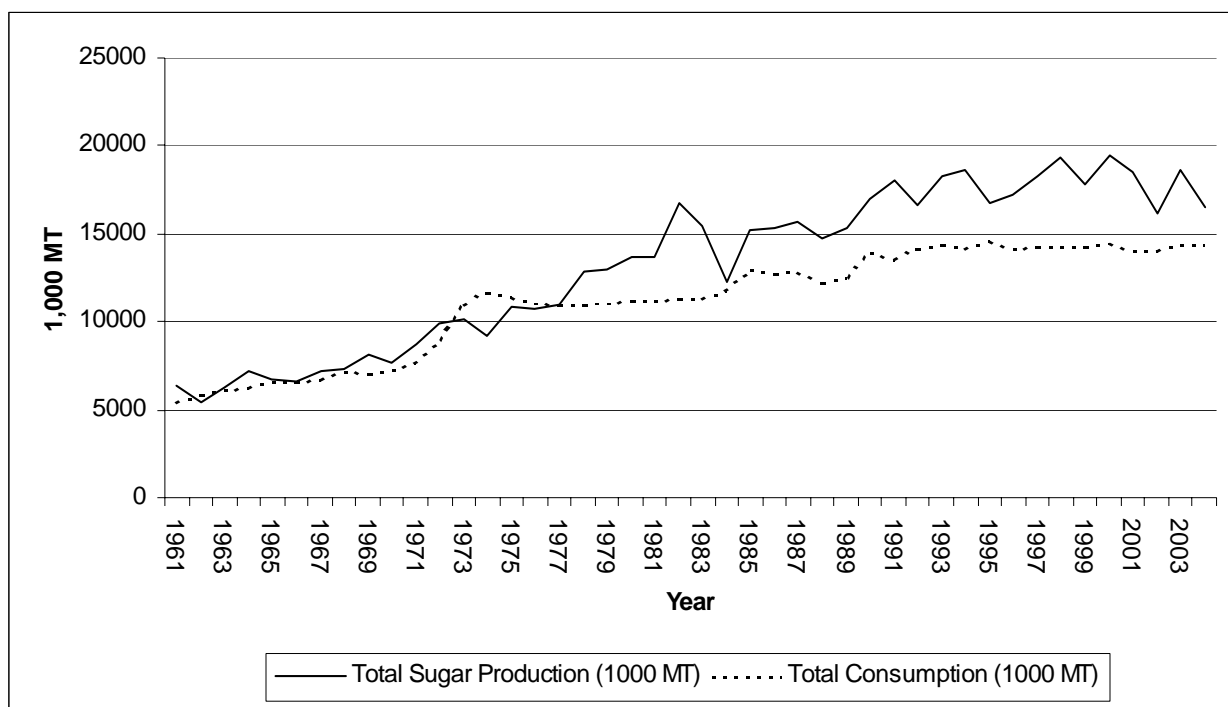


Figure 1. Total Sugar Production and Consumption in the EU (1960-2004)

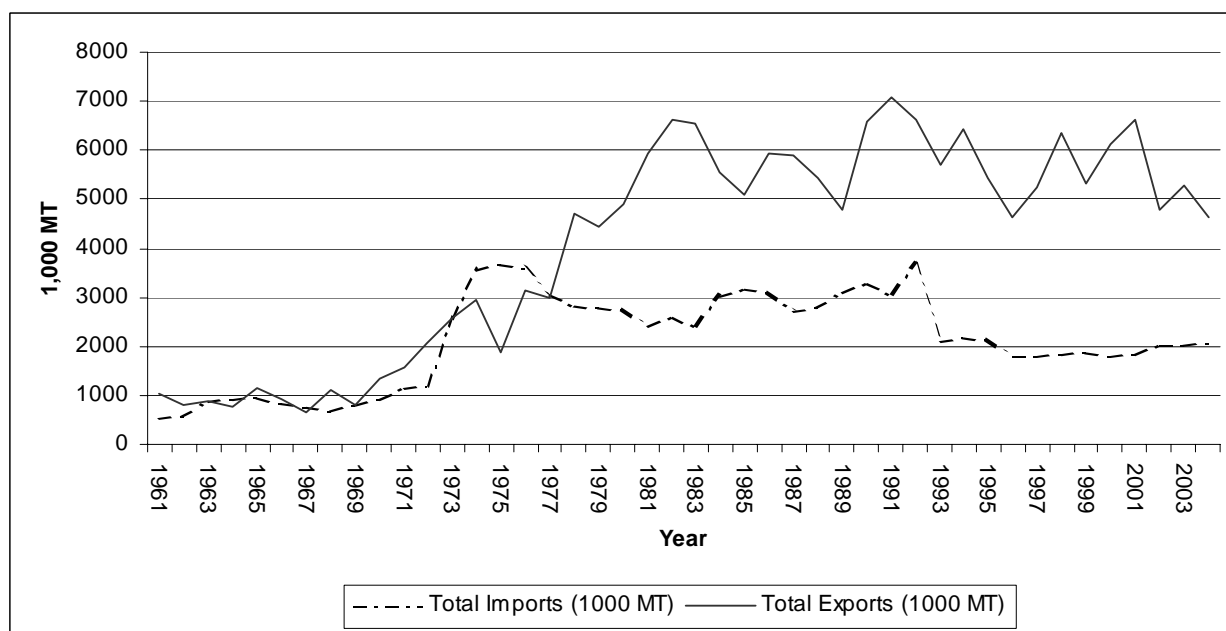


Figure 2. Total Sugar Imports and Exports by the EU (1960-2004)

## *Japan*

The Japanese government protects its country's sugar industry by implementing minimum prices for sugar beets and cane, controls on raw sugar imports, prohibitive duties on refined sugar imports, and tariffs and quotas on products containing sugar and sugar substitutes. Also, the government regulates the production and price of high fructose corn syrup (HFCS) in order to limit competition with sugar producers (Mitchell, 2004; ERS-USDA, 2003).

During the period 1989-2004, total sugar production in Japan declined by 14 percent, mainly due to a reduction in the production of sugar cane (53 percent). Total production in 1989 was 988,000 MT, while in 2004, production declined to 850,000 MT. Sugar imports also have declined from 1.8 million MT, in 1989, to 1.5 million MT in 2004, which represents a decline of about 18 percent. Exports of refined sugar increased from 2,000 MT in 1989 to 10,000 MT in 2000 and have remained at this level until 2004. Domestic consumption of sugar has decreased by 19 percent from 1989 (2.8 million MT) to 2004 (2.3 million MT) (ERS-USDA, PS&D Tables).

## *United States*

The two main elements of U.S. sugar policy are the price support loan program and the Tariff-Rate Quota (TRQ) import system. Additionally, the United States has international sugar trade agreements, including the North American Free Trade Agreement (NAFTA). The United States also operates the Refined Sugar and Sugar-Containing Products Re-Export Programs to allow U.S. participants to buy sugar at world prices for use in products that will be exported in the world market (ERS-USDA, 2005; Mitchell, 2004).

The current 2002 Farm Act allows the USDA to make loans available to processors of 18 cents per pound of domestically grown sugarcane and 22.9 cents per pound of domestically grown sugar beets. The Farm Act also requires the USDA to continue operating the program at no cost to the federal government. To meet this objective, the Payment in Kind program (PIK) has been continued to reduce inventories. The program allows producers to bid for the amount of inventory they would accept in exchange for not harvesting planted acreage. Another mechanism of control through the USDA is the use of allotments to avoid forfeitures. The allotments are implemented only when sugar imports are less than 1.532 million short tons raw value (STRV). The overall allotment for FY 2005 was set at 8.1 billion STRV (ERS-USDA, 2005). Also, the current Act terminated the forfeiture penalty on cane and beet processors and reduced interest rates on sugar loans by one percentage point.

In the Uruguay Round of the General Agreement of Tariffs and Trade (GATT), the United States agreed to a minimum import quantity of 1.256 million STRV of raw and refined sugar (ERS-USDA, 2005). Under the North American Free Trade Agreement (NAFTA), additional sugar imports were allocated to Mexico since 1994. During the first six years of NAFTA, Mexico had duty-free access for sugar exports to the United States in the amount of its net surplus production, up to a maximum of 25,000 MT. If the country was not a surplus producer for two years, duty-free access was limited to 7,258 MT. After the seventh year, the limit of the duty-free access was 150,000 MT, increasing 10 percent until free access in 2008 (ERS-USDA, 2005). However, Mexican sugar access to the U.S. market continues to be under dispute. The

closing negotiations of NAFTA produced different versions of the agreement, mainly related to determining Mexico's status as a surplus producer and the quota size for duty-free imports (Kornis, 2001).

Another problem under dispute is U.S. access to the Mexican HFCS market. Since 1998, Mexican authorities imposed antidumping duties on U.S. HFCS. In 2002, the duties were replaced by a 20 percent tax on products used to produce soft drinks. Additionally, a 20 percent tax on services related to the distribution of syrups was imposed (U.S. Office of the Trade Representative, 2005).

Sugar production in the United States during the 1989-2004 period increased by 27 percent. Total production in 1989 was 6.1 million MT and increased to 7.7 million MT in 2004. During the same period, sugar imports declined from 2.4 million MT in 1989 to 1.5 million MT in 2004, representing a decrease of about 37 percent. Exports of refined sugar decreased from 584,000 MT in 1989 to 181,000 MT in 2004 (69 percent). Domestic consumption of sugar increased by 15 percent since 1989 (from 7.8 million MT to 9.0 million MT) (ERS-USDA, PS&D Tables).

### ***Australia***

Since 1997, Australian sugar prices have been based on world market prices with no government intervention (Queensland Sugar Corporation, 1997). However, the government recently decided to assist the sugar industry by providing income support to producers, interest rates subsidies, and assistance packages for diversification (ERS-USDA, 2003).

### ***Brazil***

The Brazilian government influences the sugar industry through its ethanol policy program. These policies have substantially influenced the growth of Brazilian sugar production and exports (Mitchell, 2004). In April 2003, the blend ratio (anhydrous-ethanol to gasoline blend) was set at 20 percent; it was increased to 25 percent in July 2003 (Koizumi, 2003). As a result of this policy, only about 50 percent of sugar cane is used to produce sugar and the rest is used to produce ethanol for automobile use (ERS-USDA, 2003; Mitchell, 2004; Koizumi, 2003).

### ***India***

The Indian sugar industry is protected with price supports, levies, and 60 percent import duties (Mitchell, 2004). Imports are also restricted by levy requirements and market release quotas. The government sets a minimum price for sugar cane; in addition to this price, the state administration can increase the support price by 20-50 percent (ERS-USDA, 2003). India also provides internal freight reimbursement and an ocean freight subsidy to increase exports when stocks of sugar accumulate (ERS-USDA, 2003).

### ***Mexico***

The Mexican government protects the sugar industry through price controls and import tariffs (Mitchell, 2004). Additionally, the government protects the industry by a system of market

allotments. Estimates of production and demand are computed, and then the government assigns the NAFTA duty free and the non-duty free NAFTA export quota among the mills. Any production over the allocations is stored, sold for non-food use, or exported (Knapp, 2004).

### ***Thailand***

The government of Thailand implements a protectionist agenda similar to that of the EU. There is a three quota system in which quota-A is for sugar used in domestic consumption, quota-B is to meet export commitments, and quota-C is for export sales (ERS-USDA, 2003). The government also uses credit and tax incentives to promote sugar exports.

### ***The Doha Agenda***

The DDA was launched in November 2001, with strong leadership by the United States. The agenda covers six broad areas, including agriculture, non-agricultural market access, services, the Singapore issues (transparency in government procurement, trade facilitation, investment, and competition), rules (trade remedies), and development-related issues (U.S. Office of Trade Representatives, 2004). The DDA is the largest negotiation of this type in history, covering items such as cars, agricultural products, communication services, and custom rules. In the agenda, the United States proposed the following:

1. eliminate agricultural export subsidies;
2. decrease levels of trade-distorting domestic support; and
3. increase real market access opportunities in developed and developing countries through tariff cuts and quota expansion (U.S. Office of Trade Representatives, 2004; WTO 2004).

Tariffs will be cut using a tiered formula that will lead to greater harmonization in tariff levels across countries. Substantial improvement in market access will be applied to all agricultural products, including sensitive products. Countries will be able to designate a specific number of sensitive products that will be handled through a combination of tariff quota expansion and tariff reductions to expand market access (WTO, 2004).

The proposal aims for the elimination of export subsidies, export credits with repayment periods beyond 180 days, and export guarantee programs. Another key objective is the elimination of trade distorting practices in sales by State Trading Enterprises (STE); thereby eliminating the monopoly power of such entities. The idea is that during the first year of implementation, each member's total permitted trade-distorting support will be cut by 20 percent from current levels (U.S. Office of Trade Representatives, 2004; WTO, 2004).

## MODEL AND SCENARIOS

The simulation model developed by Benirschka et al. (1996) was used to estimate changes in sugar production, consumption, and price. The model includes 17 countries and regions: Australia, Brazil, Cuba, the EU-25, South Africa, and Thailand as major exporters; and Algeria, Canada, China, Indonesia, Egypt, India, Japan, Mexico, the Former Soviet Union, the United States, and the Rest of the World region as major importers. The model computes how production, supply, demand, consumption, trade, and price react, within the United States and the world, as variables in the system are changed.

### *Model Structure*

Sugar supply or production ( $qp_{i,t}$ ) is estimated as the product of the area harvested and the yield per hectare, where the area harvested ( $a_{i,t}$ ) is expressed as a function of expected prices of sugar ( $p_{t-1}$ ), alternative crops ( $p^c_{t-1}$ ), and policy parameters ( $g_t$ ):

$$a_{i,t} = f(a_{i,t-1}, p_{t-1}, p^c_{t-1}, g_t) \quad (1)$$

Additionally, a lagged dependent variable ( $a_{i,t-1}$ ) is included to provide for dynamics related to producers' cropping decisions, and  $i$  indexes for cane sugar or beet sugar. For each region, the model calculates total consumption of sugar ( $qd_t$ ) as the product of per capita consumption and population. Per capita consumption ( $fd_t$ ) depends on the price of sugar ( $p_t$ ), per capita disposable income ( $cy_t$ ), and a time trend variable ( $t$ ) to provide for changes in tastes and preferences of consumers:

$$fd_t = g(p_t, cy_t, t). \quad (2)$$

Carry-out stocks equations ( $qs_t$ ) are calculated as a function of domestic production ( $qp_t$ ), price ( $p_t$ ), and carry-in stocks ( $qs_{t-1}$ ). These stocks protect against unexpected reductions in production, and therefore depend on the level of domestic production and the opportunity cost of storing sugar (Koo, 2002):

$$qs_t = h(qs_{t-1}, qp_t, p_t). \quad (3)$$

The sum of domestic production ( $qp_{t-1}$ ) and carry-in stocks ( $qs_{t-1}$ ) represents domestic supply, and the sum of domestic consumption ( $qd_t$ ) and carry-out stocks ( $qs_t$ ) is total demand. Net exports ( $qx_t$ ) are then estimated as the difference between domestic supply and total demand, and a market equilibrium condition is expressed as:

$$\sum_{n=1}^N qx_t^n = 0, n = 1, 2, \dots, 17. \quad (4)$$

From this equilibrium condition, the equilibrium world price of sugar is calculated and expressed as domestic price for each region using official exchange rates. Finally, the sugar wholesale

price in each region is computed as a function of the world market price in domestic currency and expressed in real terms (Benirschka et al., 1996).

### ***Base and Alternative Scenarios***

A base and two alternative scenarios are developed to evaluate the impact of trade liberalization policy alternatives on the U.S. industry and world price. The base and alternative models are presented as follows.

*Base scenario.* The base-line case includes the expected sugar imports from the Central American Free Trade Agreement (CAFTA), 107,000 MT (Koo et al., 2003), and includes implementation of NAFTA, but with limited imports from Mexico. Average climate conditions and historical rates of technological change are assumed. Additionally, it is assumed that current agricultural policies will be continued in all countries. The price of sugar in all regions is assumed to be endogenous; however, the price of other crops is exogenous. Forecasted exogenous prices were obtained from the Food and Agricultural Policy Research Institute (FAPRI) World Agricultural Outlook (2005). Assumptions of gross domestic product (GDP) growth rates, interest rates, exchange rates, and inflation rates were also obtained from FAPRI (2005).

*Scenario 2.* This case assumes the EU partially liberalizes its sugar industry by implementing some of the changes proposed in 2004, while the other countries maintain their current policy programs. Under this scenario, the price of refined sugar was reduced from €632 to €421 (758 to 505 U.S. dollars) per metric ton, production quota decreased from 17.4 million MT to 14.9 million, and new member countries (Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia) were treated as old members.

*Scenario 3.* Under this scenario, the EU, China, Japan, and the United States partially liberalize their sugar industries under the current WTO-Doha Development Agenda. Variations in the model include the proposed changes from the EU included in scenario 2, plus a 20 percent cut in tariffs and a 20 percent increase in import quotas from China, Japan, and the United States. Policies in all other countries were assumed to remain constant, with limited U.S. sugar imports from Mexico.

## **IMPACT ON THE U.S. SUGAR INDUSTRY AND WORLD PRICE**

Table 1 presents the results of the simulation model under the base and alternative scenarios for the United States and the Caribbean sugar price, which is a reference for the world price. In 2004, U.S. sugar production was 4.4 and 4.1 million short tons (ST) from beet sugar and cane sugar, respectively. Total consumption was 9.9 million ST and net imports accounted for 1.4 million ST. Prices in 2004 were 40 and 27 dollars per ST of sugar beets and sugar cane, respectively, while the wholesale sugar price was 26.15 cents per pound. The Caribbean price was 8.4 cents per pound in 2004.



Table 1. Sugar Price, Production, Consumption, and Net Imports Under the Base and Alternative Scenarios in the United States

Scenarios in the United States						
Category		Units	Actual 2004 Levels	2013 Projections		
				Base Line Scenario 1	EU Scenario 2	WTO-Doha Scenario 3
<u>United States</u>						
Beet Sugar Production		1,000 ST <sup>a</sup>	4358	4683	4685	4636
Cane Sugar Production		1,000 ST	4120	4367	4369	4333
Total Consumption		1,000 ST	9905	10703	10716	10803
Net Imports		1,000 ST	1429	1670	1670	1927
Sugar Beets Price		Dollars/ST	40	40.34	40.15	38.96
Sugar Cane Price		Dollars/ST	27	27.73	27.56	26.43
Wholesale Sugar Price		Cents per Lb	26.15	24.89	24.74	23.79
<u>World</u>	Caribbean	U.S. Cents per Lb	8.4	8.7	9.96	12.1

<sup>a</sup> ST = short tons

For the year 2013, the base scenario projects an increase in beet sugar and cane sugar production of 7.5 and 6 percent, respectively. Production is estimated at 4.7 million ST for beet sugar and 4.4 million ST for cane sugar. Net imports are expected to be 1.7 million ST, which represent an increase of 17 percent when compared to levels in 2004. As more sugar is available in the U.S. market, the model also projects the total volume of sugar consumption will be 10.7 million ST, an 8.1 percent increase. Sugar beets and sugar cane prices are expected to increase by 1 and 3 percent, respectively; however, the wholesale sugar price in the United States is expected to be 24.89 cents per pound, 5 percent lower than the 2004 level.<sup>1</sup> The Caribbean sugar price from the base scenario in 2013 is expected to be slightly higher (3.6 percent) than the price in 2004.

### ***Limited Liberalization of the Sugar Industry under the EU Proposal (Scenario 2)***

In this scenario, the EU reduces the intervention price of sugar from 758 to 505 U.S. dollars per metric ton, and production quota falls from 17.4 million MT to 14.9 million MT. Table 1 shows that U.S. beet and cane sugar production are projected to increase, but only by about 0.1 percent when compared to the base-line scenario. Consumption will increase by only 0.1 percent, and net imports will remain at the same level of the base line scenario. Prices in the United States will decrease to 40.15 dollars per ST for sugar beets and to 27.56 dollars for sugar cane,

<sup>1</sup> The reduction in the wholesale sugar price was expected as additional sugar is supplied from increased imports and production. Although the increase in sugar beets and sugar cane prices is marginal, the direction of this change was not expected. This result can be explained as an effect of increased efficiency of U.S. sugar processing plants during the last years. Regardless of the wholesale sugar price, sugar beets and sugar cane prices have remained stable or slightly increasing, mainly as a consequence of lower operating cost in sugar plants.

representing a decrease of 0.5 and 0.6 percent, respectively. Also, the wholesale sugar price in the United States is projected to decrease by 0.6 percent to 24.74 cents per pound. By contrast, the world price is expected to increase about 14.5 percent, from 8.7 cents to 9.96 cents per pound, mainly because the proposal will reduce EU sugar exports while the world demand remains unchanged.

In general, results from this scenario suggest that the proposed EU reform will increase Caribbean price, but will not significantly affect the U.S. sugar industry. Under this policy, it is expected that sugar exports from the EU will decrease and consequently sugar imports will increase. Therefore, the world sugar market adjusts to these changes in the EU and the world price becomes higher than the base-line scenario.

### ***Limited Liberalization under WTO-Doha in Selected Countries (Scenario 3)***

This scenario includes the proposed changes from the EU, plus a 20 percent reduction in sugar tariffs and a 20 percent increase in import quotas from China, Japan, and the United States. However, U.S. imports from Mexico under NAFTA are limited. When compared to the base-line scenario, results from Table 1 show that beet and cane sugar production are expected to decrease by 1.0 and 0.8 percent, respectively. Total consumption is projected to increase by about 0.9 percent. However, freer trade policies will increase U.S. imports by 15.4 percent up to a volume of 1.9 million ST. Prices are expected to decrease to 38.96 and 26.43 dollars per ST for sugar beets and sugar cane, respectively. This change in price represents a reduction of 3.4 percent for sugar beets and 4.7 percent for sugar cane. In addition, the wholesale sugar price in the United States is expected to decrease by 4.4 percent, to 23.79 cents per pound. Higher sugar supply in the United States from increased imports, compared to a relatively small increase in sugar consumption, will cause a reduction in the price of sugar. In contrast, the world sugar price is projected to increase to 12.1 cents per pound, a 39 percent increase over the base-line scenario, because increased imports from consuming countries stimulate world demand for sugar, while the supply of sugar remains unchanged.

The increase in the Caribbean price of sugar may stimulate some changes from major sugar producing countries. Table 2 presents changes in production, consumption, and trade in selected countries under the WTO-Doha scenario. Results indicate that Brazil will substantially increase production and exports. Total value of exports from Brazil, evaluated at 12.1 cents per pound, will increase by about 2.9 billion U.S. dollars. For Thailand and Australia, export revenues will increase by 0.46 and 0.31 billion U.S. dollars, respectively. The EU, India, and China are expected to increase imports significantly, while Japan and the United States are likely to have moderate increases in imports.

Although some countries (low cost sugar producers) will benefit from a higher world sugar price, other producers could be seriously affected, as sugar traded under preferential agreements with the EU and the United States will be valued at a lower price.

Table 2. Production, Consumption, and Trade in Selected Countries Under the Base and WTO-Doha Scenarios

Country	Production 1,000 Metric Tons		Consumption 1,000 Metric Tons		Trade <sup>a</sup> 1,000 Metric Tons	
	Base Scenario	WTO-Doha	Base Scenario	WTO-Doha	Base Scenario	WTO-Doha
Australia	5391	5430	1337	1336	4054	4093
Brazil	33039	38089	11582	11582	21458	26509
China	10706	10865	14371	15628	-3685	-4761
European Union	18834	15096	17526	17526	1293	-2444
India	21044	21165	21693	25047	-684	-3939
Japan	892	795	2397	2518	-1503	-1721
Mexico	6239	6289	5824	5821	-405	-460
Thailand	8237	8310	2332	2330	5888	5963
United States	8236	8162	9740	9831	-1520	-1754

<sup>a</sup> Negative values indicate net importers.

### *Welfare Effects*

In order to evaluate the welfare effects, changes in consumer and producer surpluses were estimated for the EU and the Doha scenarios. Because of differences in the price elasticity of supply between sugar beet and sugar cane producers (Koo, 2002; Benirshka et al., 1996), producer surpluses for sugar beet and cane are presented in Table 3.

Both of the scenarios resulted in a reduction in the wholesale sugar price and a consequent reduction in the prices of sugar beets and sugar cane. From this outcome, it is expected that consumer surplus increases, while the opposite occurs for producer surplus (Table 3). When compared to the base-line scenario, the value of consumer surplus increases by 4.1 million dollars for the EU scenario and by 30.9 million dollars for the Doha scenario. In contrast, the value of producer surplus decreases by 1.6 and 12.1 million dollars for the EU and Doha scenarios, respectively. The total welfare change in both scenarios is positive: 2.7 million dollars for the EU scenario and 18.9 million dollars for the Doha scenario. The effect of the WTO-Doha scenario is significantly larger than that of the EU scenario.

Table 3. Changes in Consumer and Producer Surplus in the United States from the Base Scenario to the EU and Doha Scenarios

Category	EU, Scenario 2 (1,000 Dollars)	WTO-Doha, Scenario 3 (1,000 Dollars)
Consumer Surplus	4066	30916
Producer Surplus	-1632	-12072
Beet Producer	-890	-6421
Cane Producer	-742	-5651
Total Change	2704	18844

Under these circumstances, reductions in sugar production are very likely to occur in the United States and production of sugar-competing crops could increase as some land is removed from sugar production. However, the effect of changes in the production of competing products is expected to be very small (Koo, 2002).

In terms of the sugar program, the reaction by the U.S. government to provide for the losses in producer surplus under the WTO-Doha scenario is unknown. One alternative could be to reduce allotments of sugar production in order to maintain domestic sugar prices at a desirable level. Another alternative is to assist the sugar industry by providing income support to producers or assistance packages for diversification.

## CONCLUSION

In April 2005, the WTO-appellate body decided to uphold the decision made in August 2004, which ruled the EU sugar exports were illegally subsidized. Before this initial decision, in July 2004, the EU proposed the reform of its sugar policy, which is expected to be published in June 2005. The changes are intended to increase the competitiveness of the sugar sector and will frame the EU position for the WTO-DDA negotiations in Hong Kong in December 2005. The reform includes a significant reduction of the intervention sugar price and reduction in the production quota (Kelch and Normile, 2004; European Commission, 2004 (a)). Additionally, under the WTO-DDA, substantial improvement in market access is being discussed for all agricultural products, including sugar. The framework calls for the elimination of export subsidies, export credits with repayment periods beyond 180 days, and export guarantee programs (U.S. Office of Trade Representatives, 2004; WTO, 2004). This study utilizes a simulation model (Benirschka et al., 1996) to analyze the potential reforms of the EU and some liberalization policies under the Doha agenda proposal in order to evaluate their impact on the U.S. sugar price and the consequences on producers and consumers. Results from these alternative policies are compared to those from a base-line scenario.

For the base-line scenario (scenario 1), it is assumed that current agricultural policies will be continued in all countries. Projections for the year 2013 indicate an increase in the production of beet sugar and cane sugar production by 7.5 and 6 percent, respectively. Net sugar imports will increase by 17 percent, and consumption is also expected to increase by 8.1 percent. Consequently, the U.S. wholesale sugar price is expected to decrease by 5 percent.

Under scenario 2, the EU reduces the intervention price of sugar from 758 to 505 U.S. dollars per metric ton, and the production quota is decreased from 17.4 million MT to 14.9 million MT. In general, results from the model indicate that if these reforms are implemented by the EU, the Caribbean sugar price will grow from 8.7 to 9.96 cents per pound, a 14.5 percent increase, but the changes will have little effect in the U.S. sugar industry.

The WTO-Doha scenario (scenario 3) includes sugar policy reforms in the EU plus a 20 percent cut in import tariffs and a 20 percent increase in import quota in China, Japan, and the United States. Under these circumstances, U.S. sugar imports will increase by 15.4 percent; however, sugar production is not expected to be significantly affected. Sugar beet and sugar cane prices are projected to decrease by 3.4 and 4.7 percent, respectively. Also, the U.S. wholesale sugar price will decrease by 4.4 percent to 23.79 cents per pound. In contrast, the world sugar price is projected to increase to 12.1 cents per pound, a 39 percent increase.

U.S. consumer and producer surplus changes were estimated for the EU and the WTO- Doha scenarios. The total welfare change in both cases is positive; however, the effect is significantly larger for the Doha case. Implementation of the Doha scenario may increase social welfare in the United States, but because of reduced prices, the policy may affect some U.S. producers.

With a higher Caribbean price under the Doha scenario, Brazil will benefit most, as production and export sales increase. Thailand and Australia are also expected to experience moderate increases in production and exports. The EU, India, and China are expected to increase imports substantially. The United States and Japan will increase imports moderately.



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